

# LA-ICPMS U-Pb ages for zircon crystals in off-scraped prism and underplating complex : an example of the Shimanto Belt

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Onset of seismogenesis in sediment-dominated accretionary margin of subduction zone might be controlled strongly by diagenesis of underthrust sediments. The diagenesis is in turn controlled by many factors, for example drain or non-drain condition, composition, stratigraphy, deformation, and subduction velocity. To elucidate the effect of subduction velocity, we analyzed U-Pb ages of zircons in tuffs and sandstones in underplating melange and the offscraped sediments of well-studied on-land accretionary complex. Such dating will also give a constraint to analyze mass flux in subduction zone.

Mugi melange and Hiwasa Formation in the northern Shimanto belt in Shikoku have been well studied. The Hiwasa Formation constitutes coherent sediments of sandstones, conglomerates, and alternations of sandstone and shale. The Mugi melange is composed of black shales, including blocks of red shales, minor cherts, acidic tuffs and basalts. The boundary between the Mugi melange and the Hiwasa Formation is the Minami-Awa Fault, which steeply dips toward the north. The Minami-Awa Fault is a roof thrust of duplex package of the Mugi melange. The Mugi melange is divided into the lower and upper sections on the basis of experienced thermal condition. The upper section suffered from 170-200 degrees C whereas the lower section experienced about 130-150 degrees C ). At the boundary between two sections, the Mizuochi Fault of out-of-sequence thrust separated the sections.

Sampling locations of zircon for U-Pb age determination are as follows: two locations for sandstone of the Hiwasa formation, one for sandstone and one for tuff of the upper section of the Mugi melange, and one sandstone and one tuff of the lower section. U-Pb dating was conducted by LA-ICPMS of Earthquake Research Institute, the University of Tokyo.

The U-Pb age of zircon in tuff represents the eruption age of volcanic ash. The sedimentary rocks include various ages of zircons, but youngest age might be close to their deposition age.

The results are in the following;

1. Sandstones of Hiwasa formation show various ages showing peaks of 70Ma, 200Ma, and 1900Ma.
2. The weighted average for age of zircon in tuff of upper section of the Mugi melange is a  $67.97 \pm 1.1$  Ma (2sigma, n=13).
3. The weighted average for age of zircon in tuff of the lower section of the Mugi melange is a  $59.67 \pm 0.77$  Ma (2sigma, n=20).

There is no age gap between the Hiwasa formation and the upper section of the Mugi melange whereas about 10 My difference between the upper and lower sections of the Mugi melange.

The results suggest that there was no age gap between underthrust complex and offscraped sediments at the time of underplating. Drilling into modern accretionary prism documents that sediments older than 10 Ma start to underthrust beneath the offscraped prism at the deformation front. Previous studies suggested that the Mugi melange and Hiwasa formation were buried to about 6-7km. Underthrusting of sediments and basement below the plate boundary decollement faster than off-scraping rate of trench-filling turbidites suggests a progressing decrease of age gap between the offscraping prism and underthrust sediments and resulting in coincidence of their ages. The age of the lower section of the Mugi melange about 10 My younger than the Hiwasa formation is consistent with general idea of faster underthrusting than off-scraping rate.